Selecting Australian equity superannuation funds: A retail investor's perspective

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Abstract In this performance persistence study, two questions are addressed. First, what is the relationship between past fund returns and future performance? Secondly, does a 'hot hand' fund selection system deliver economically significant returns to investors? Using a sample of Australian equity superannuation funds over the 1990s, the answers from this study are as follows: on a raw and risk-adjusted return basis the authors find evidence of mean reversion, with prior annual performance having little influence on future fund return. Selecting funds based on a persistence strategy resulted in underperformance of industry and passive returns for the retail superannuation investor over the sample period. The findings of the study have serious implications for financial planning advisers who market superannuation funds based on past performance. The results suggest that previous annual performance has little influence on future returns.

Keywords Superannuation funds, Australia, performance persistence, past performance

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INTRODUCTION

'Does active investment management add value?' This question has been the source of continued debate in financial economics since the contributions of Sharpe,[1] Treynor[2] and Jensen.[3] One strand of literature finds that investment managers have little stock-selection ability consistent with the efficient market framework of Fama.[4] Research from the USA by Malkiel[5] and Gruber[6] and from the UK

by Leger[7] finds that the investment management industry, on average, destroys value for investors through underperforming benchmark returns. For instance, Gruber reports that the average mutual fund underperforms index returns by some 65 basis points per annum for the period 1985 through 1994. These studies advocate a passive approach to the stock-selection problem.[6]

By contrast, another strand of literature finds some limited evidence of stock-selection ability by managers. Grinblatt and Titman,[8] Wermers,[9] and Kosowski *et al.*[10] find that investment managers select stocks that outperform benchmark returns, reflecting the incomplete arbitrage model of Grossman and Stiglitz.[11] Moskowitz explains that this second set of studies examines the individual equity holdings of funds, creating a hypothetical portfolio for each fund that contains only stocks and does not account for transaction costs or expenses.[12] Wermers reports that while the gross returns from equity holdings outperform a broad market index by 130 basis points per year, the net fund returns under-perform the same index by 100 basis points per year. He reports that of this 230 basis points difference, approximately 160 basis points are split evenly between fund expenses and transaction costs, with the remainder attributed to bond and cash holdings.[9]

While both schools take differing approaches to the evaluation problem, considerable consensus is found that, as an industry, investment managers underperform stated benchmarks on an after-fee basis (ie post-transaction costs and management expenses). The value (or otherwise) of active management has immediate implications for Australia's system of retirement funding, termed superannuation. (A common type of managed fund in Australia is the superannuation fund. Superannuation funds are designed to set aside an amount during the working lives of people to meet their financial needs during retirement.) This is potentially important as the international experience suggests that active investing resulted in a high-cost production function for investment management that yields, in aggregate, poor results. Investors who select an active fund require the manager to execute stock trades at prices sufficiently different from fully informed prices, first, to compensate them for the cost of becoming informed and, secondly, to earn superior risk-adjusted returns.

Recent research considering this issue by Drew and Noland,[13] Drew and Stanford,[14–16] Sawicki[17] and Sawicki and Ong[18] for the Australian setting provides corroborating evidence of the experience in the USA. Drew and Stanford[14] find that the average domestic equity superannuation fund underperforms benchmark returns by a range of 46–93 basis points per annum for the period 1991 through to 1999. Moreover, Drew and Stanford find that active funds are regularly terminated due to poor performance, with survivorship bias negatively affecting industry performance by 23 basis points per annum on a risk-adjusted basis.[15] They find that, as an industry, investment managers destroy value for superannuation members, with the costs of research and trading associated with active management being largely sunk.

This study departs from the tradition of a broad industry-based evaluation of the investment management industry and considers whether the portfolio returns achieved by individual investment managers persist through time. Are there investment managers who have a 'hot hand' providing consistently high returns for investors? Can investors fashion a fund selection strategy that would, ex-ante, permit them to garner superior returns? Specifically, this study tests the hypothesis

that the relative return achieved by a fund last year has no predictive value for tomorrow.

PREVIOUS RESEARCH

The ability to predict the future performance of funds based on ex-ante information has been the topic of intense debate by investors, practitioners and researchers alike. The received statement of market efficiency, the efficient market hypothesis, implies that historical performance is no guide to future performance and that any excess performance achieved by an investment manager is the result of chance, not the skilful application of active stock selection techniques. Empirical testing of this position, however, has provided mixed results over the 1990s.

The persistence case, forwarded by Hendricks *et al.*[19] Goetzmann and Ibbotson,[20] Brown and Goetzmann,[21] Kahn and Rudd,[22] Bal and Leger,[23] Elton *et al.*[24] Gruber,[6] Stewart,[25] and Carpenter and Lynch[26] states that past returns and relative rankings are useful in predicting returns and rankings in the short run (1–3 years). Gruber also finds that expenses, raw returns, risk-adjusted alphas, multifactor asset pricing model alphas and new money flows into mutual funds forecast positive relative performance.[6] Grinblatt and Titman provide longer-term evidence of persistence (ten years), indicating that there is positive persistence in mutual fund performance.[27]

In a novel approach, Bauman and Miller rank the performance of funds over complete stock market cycles, reporting that the correlations of portfolio performance rankings from one market cycle to the next are generally positive and meaningful.[28,29] If the persistence anomaly holds, superannuation investors could achieve their retirement objectives far more rapidly through the selection of active managers, on an ex-ante basis, that would consistently deliver superior returns.

The case rejecting the differential skill of managers consistently through time is led by Troutman,[30] Brown *et al.*[31] Lakonishok *et al.*[32] Bogle,[33] Malkiel,[5] Carhart,[34] Cheng *et al.*[35] These researchers consider both raw and risk-adjusted returns from individual funds and investment management firms, answering the question of whether persistence is economically significant in the negative.

The contribution of Carhart shows the failure of the capital asset pricing model to capture the cross-section of fund returns (particularly relating to short-term momentum effects in stock returns) and is responsible for the persistence puzzle.[34] Carhart observes that performance persistence is simply a matter of luck, stating that

> '(these funds) accidentally end up holding last year's winners. Since the returns on these stocks are above average in the ensuing year, if these funds simply hold their winning stocks, they will enjoy higher one-year expected returns and incur no additional transaction costs for this portfolio. With so many mutual funds, it does not seem unlikely that some funds will be holding many of last year's winning stocks simply by chance.'[34] (pp. 73)

This study adjusts for risk using the Sharpe (1966, 1994) index, in an attempt to mitigate the problem of benchmark inefficiency.[1,36]

Arteaga *et al.* find that performance persistence by investment management firms is captured by marketing oriented explanations.[37] For instance, Arteaga *et al.* report that incubator funds remain small while private, but once opened, funds quickly increase in size and revert to median performance. They also find that

the first-year success of selection attention funds also attract a large amount of cash inflows, which undermines their subsequent performance.[37] This strategic behaviour by the investment management industry provides the appearance of superior performance, with poor-performing incubator funds (and their track record) closed or merged into a larger fund. Researchers have also recently found evidence rejecting performance persistence outside traditional equity funds. Using a sample of hedge funds in the USA, Brown *et al.* report no evidence of performance predictability on a raw return and risk-adjusted basis.[38]

Troutman describes the reliance investors place on past performance data when selecting funds as a 'cognitive error, as many (trustees) see strong past performance and prestigious client lists as representative of future investment management ability' (pp. 37).[30] The implication of findings largely supportive of the efficient market hypothesis by this second group of researchers is neatly summarised by Lakonishok *et al.*[32] They deduce that no evidence of return persistence over time permits researchers to 'make the stronger statement that not only do (pension) funds *on average* fail to add value, but the same is true for just about *all of them*' (pp. 356).

The performance persistence debate has immediate implications for Australia's superannuation fund industry, particularly for the choice of fund decision. Shefrin suggests that 'there does seem to be something of a hot-hands effect. But most investors misread what this performance says about the future ... (investors) tend to attribute too much of that success to skill rather than luck' (pp. 174).[39] The continued controversy surrounding the predictability (or otherwise) of fund returns provides the motivation for this study to explore whether the hot-hand anomaly can be exploited in an economically significant manner for superannuation investors. In investigating this question, the paper considers the fund selection problem from the perspective of a retail investor. (Retail funds are superannuation products that typically have a minimum initial investment amount of AU$2,000 and subsequent minimum contributions of AU$100. Retail funds are commonly used by individual investors with superannuation assets of less than AU100,000 to be invested per fund.) Specifically, this study considers:

- the randomness of Australian equity superannuation fund performance, using past performance (raw and risk-adjusted returns) as the criterion for fund selection
- a real-world simulation of the actual results achieved by this system of fund selection over the 1990s
- implications for the fund selection decision to be made by retail superannuation investors.

Alternative questions considered in the contemporary literature have included: comparing professional management versus the returns of individual investors;[40] compensation of advisers;[41] investor response to past performance using flow data;[17] and, the price effects of fund trading.[42]

RESEARCH DESIGN

The data used in this study consist of monthly returns for a sample of 148 retail 'Australian Equity Superannuation Funds–General' as classified by Morningstar, as well as monthly returns on an accumulation market portfolio index from January 1991 through to December 1999. The fund returns were obtained from Morningstar's Australian Superannuation Funds database; with the market return

provided by the Australian Stock Exchange. The monthly fund data provided by Morningstar were net of management fees and excluded entry and exit loads. The sample included all funds that existed over the sample period (including all terminated funds). The non-exculsion of funds that did not survive the entire sample period is designed to minimise the impact of the methodological flaw known as survivorship bias. Elton *et al.* argue that samples that do not correct for attrition will overstate the return that funds earn for their investors. Furthermore, ignoring attrition may differentially have an impact on the return reported for funds with different objectives, because funds with different objectives may have different rates of attrition.[43] Brown *et al.* show that the strength of survivorship bias can be strong enough to account for the evidence favouring return predictability.[31]

This study is concerned with whether a cognitive bias towards past performance data by superannuation investors is detrimental to total portfolio returns. Specifically, the authors ask whether, on an ex-ante basis, investors are able to differentiate between luck and investment manager skill in an economically meaningful way. Given the focus on the problem from a retail perspective, the selection of performance metrics must reflect techniques that are accessible and commonly employed by individual investors (and their financial advisers) to guide fund choice. Following the research motivation, two annual performance metrics are considered: first, raw or risk-unadjusted returns; and secondly, a Sharpe index proxy of risk-adjusted returns, estimated as the fund's annual excess return over the Reserve Bank of Australia 13-week treasury note divided by the fund's annual standard deviation of returns. (The Sharpe (1966, 1994)[1,36] ratio measures the expected return per unit of risk for a zero-investment strategy. Support for selection of the Sharpe index as a proxy for risk-adjusted returns is provided by Bal and Leger[23] based on Roll's critique.[44] Treynor[2] and Jensen[3] measures can only be estimated with respect to a market index, making it difficult to interpret the measure within a CAPM equilibrium framework due to inefficient benchmarks. For a discussion of the limitations of single-index measures and multi-index alternatives for Australian equity superannuation funds see Drew and Stanford[14].) Across the two metrics, several experiments were conducted to test for persistence in Australian equity superannuation fund returns. Specifically, the testing procedure was divided into three steps:

1 Following Bogle, the authors calculated the past returns of all funds, selected the top five, ten and 20 in each calendar year period, and then recorded the future yearly return actually achieved. (Due to a sample size of over 800 funds, Bogle considers only the top 20 funds.)[33]
2 Grinblatt and Titman,[27] Goetzmann and Ibbotson,[20] Kahn and Rudd[22] and Brown *et al.*[31] test persistence by using a year-by-year cross-sectional regression of past returns on current returns. Such a technique is also used in this study with a significant *t*-statistic for the slope coefficient leading to a rejection of the null hypothesis that past performance is unrelated to future performance. The cross-sectional regression takes the form $\alpha_{it} = \alpha + b\alpha_{it-1} + e_i$, where: α_{it} is the performance measure for fund i in period t; b is the slope coefficient measuring performance persistence; α_{it-1} is the performance measure for fund i in period t-1; and e_i is the random error term. A significant positive (negative) slope coefficient is evidence of performance persistence (reversal).

3 Finally, a non-parametric two-way contingency matrix experiment is adopted as a confirmatory measure. First, the funds were sorted into winners and losers in period $t-1$ and winners and losers in period t. Winners were distinguished from losers by ranking fund performance to the median performance, defining the above-median performers as winners and below-median performing funds as losers. If the statistical evidence shows that winners in period $t-1$ persist as winners in period t, the authors argue that this is evidence of performance persistence.[12] The contingency tables illustrate the frequency of four possible outcomes: winner-winner (WW); loser-winner (LW); winner-loser (WL); and loser-loser (LL). Following Malkiel the z-test for repeat winners was calculated as follows. Let p be the probability that a winning fund continues to be a winner in the next year, and assume independence across funds.[5] If there is no performance persistence, p would be expected to equal 0.5. Therefore, evidence against persistence in winning would be provided by failing to reject the hypothesis that $p = 0.5$. Since the random variable Y of the number of persistently winning funds will take the form of a binomial distribution $b(n, p)$, the authors conduct a binomial test to see if the probability p of persistent winning is greater than 0.5. Malkiel[5] and Bers[45] note that when n is reasonably large, say when $n \geqslant 20$, the random $Z = (Y-np) / np(1-p)$, which is shown in Table 3, will be approximately distributed as normal with mean zero and standard deviation one.

ANALYSIS

Raw returns

The authors commenced their analysis of performance persistence in raw returns through an examination of how the best performing funds in one year perform the following year using Bogle's framework.[33] To minimise the possibility of randomness in any single year, comparisons were made of fund rankings in each year throughout the 1990s (ie how the top five, ten and 20 fund performers of 1991 ranked in 1992, through to how the best performing funds in 1998 performed in 1999).

The evidence provided in Table 1 suggests that a top performing fund in one year has borne no systematic relationship to its ranking in the subsequent year. An equally weighted portfolio of the top five ranked funds in the first year provides a raw return of +33.58 per cent, over double the average return for all funds of +14.94 per cent. In the second year, the average return falls to +11.83 per cent, below the average fund return of +13.90 per cent. Funds that rank in the top five in a given year, on average, ranked 71 (of 119 funds) in the subsequent year. The authors follow Lo[46] and Bogle[33] in describing this as evidence of mean reversion. When examining the question of performance persistence over a full decade, it appears from the preliminary analysis that a strategy of investing in the best performing funds of the past year provides no ex-ante information regarding the selection of winners in the subsequent year.

The second test of persistence is a year-by-year cross-sectional regression of past returns on current returns. Positive estimates of the coefficient b with significant t-statistics are evidence of persistence. In this case, period $t-1$ performance contains useful information for predicting period t performance. Figure 1 shows eight scatter plots (1991–92 through to 1998–99) with OLS lines showing the regression slopes for each of these tests. Brown *et al.* note that the upper right quadrant in each panel gives

Table 1 Rank order of top five, ten and 20 funds, raw returns

Raw returns	Rank in Year one	1992	1993	1994	1995	1996	1997	1998	1999	Average Year two
	1	68	49	66	132	12	112	127	57	78
	2	77	86	33	131	1	109	128	112	85
	3	78	9	50	124	7	2	26	113	51
	4	62	10	19	94	139	120	27	114	73
	5	11	86	18	95	138	1	125	51	66
	6	69	87	25	130	135	83	126	55	89
	7	70	37	12	128	130	10	20	123	66
	8	71	38	13	129	71	5	21	124	56
	9	72	85	4	127	34	6	22	120	55
	10	66	84	5	125	35	16	24	121	60
	11	67	4	53	126	118	15	30	122	67
	12	47	35	34	123	119	54	31	126	71
	13	48	36	35	121	113	139	25	128	81
	14	63	75	37	122	114	138	28	127	88
	15	64	76	67	120	115	137	123	130	104
	16	74	77	59	118	124	132	124	131	105
	17	75	78	60	117	125	44	9	10	65
	18	55	79	64	100	121	38	10	13	60
	19	56	69	65	99	122	39	11	9	59
	20	40	70	37	31	123	40	7	117	58
				Summary of average raw returns (% pa)						
Top five funds	33.58	−2.22	27.17	−2.92	12.85	17.49	15.31	1.41	25.52	11.83
Top ten funds	28.67	−3.11	27.72	0.87	10.63	14.20	17.73	5.21	23.03	12.04
Top 20 funds	24.69	−2.32	29.17	−2.88	11.07	11.83	16.53	7.33	23.91	11.83
All funds	14.94	1.11	33.21	−3.97	16.61	13.84	11.76	7.34	31.28	13.90
Market	15.78	−1.40	37.62	-7.78	20.15	12.32	15.17	12.57	33.09	15.22
No. of funds	113	80	87	98	132	143	139	135	135	119

the WW category and the lower left quadrant corresponds to the LL category (referred to in Table 4 of this study).[38] The test results are summarised in Table 2.

The results reported in Table 2 show that winners follow winners in an economically meaningful way in 1996–97 and 1997–98. However, this pattern reverses in 1991–92, 1992–93, 1994–95 and 1998–99. In these periods winners lose, with a significant reversal pattern evident. Over the entire period, a non-significant relationship was found, with the estimated slope coefficient being negative, indicating a bias towards an annual reversal of returns. Given the inconsistency of the persistence results, the null hypothesis of no systematic persistence on a raw return basis cannot be rejected.

Table 2 Repeat-winner test results, raw returns

Year	b-coefficient	t-statistic	R^2
1991–92	−0.2200	−4.6076	0.2302
1992–93	−0.2465	−3.0253	0.1050
1993–94	−0.0814	−0.9764	0.0111
1994–95	−0.4210	−8.5368	0.4447
1995–96	−0.0455	−0.5192	0.0021
1996–97	0.6326	5.4857	0.1801
1997–98	0.4260	7.1694	0.2787
1998–99	−1.0662	−8.9193	0.3743
1991–92 to 1998–99	−0.1277	−1.7412	0.2033

Finally, contingency tables were used in a non-parametric test of performance predictability. Table 3 confirms that there is little evidence of persistence in fund performance over the 1990s. The null hypothesis of no winning predictability is not rejected in any of the years covered on a raw returns basis, with no statistically significant results recorded. For the individual years, five years out of

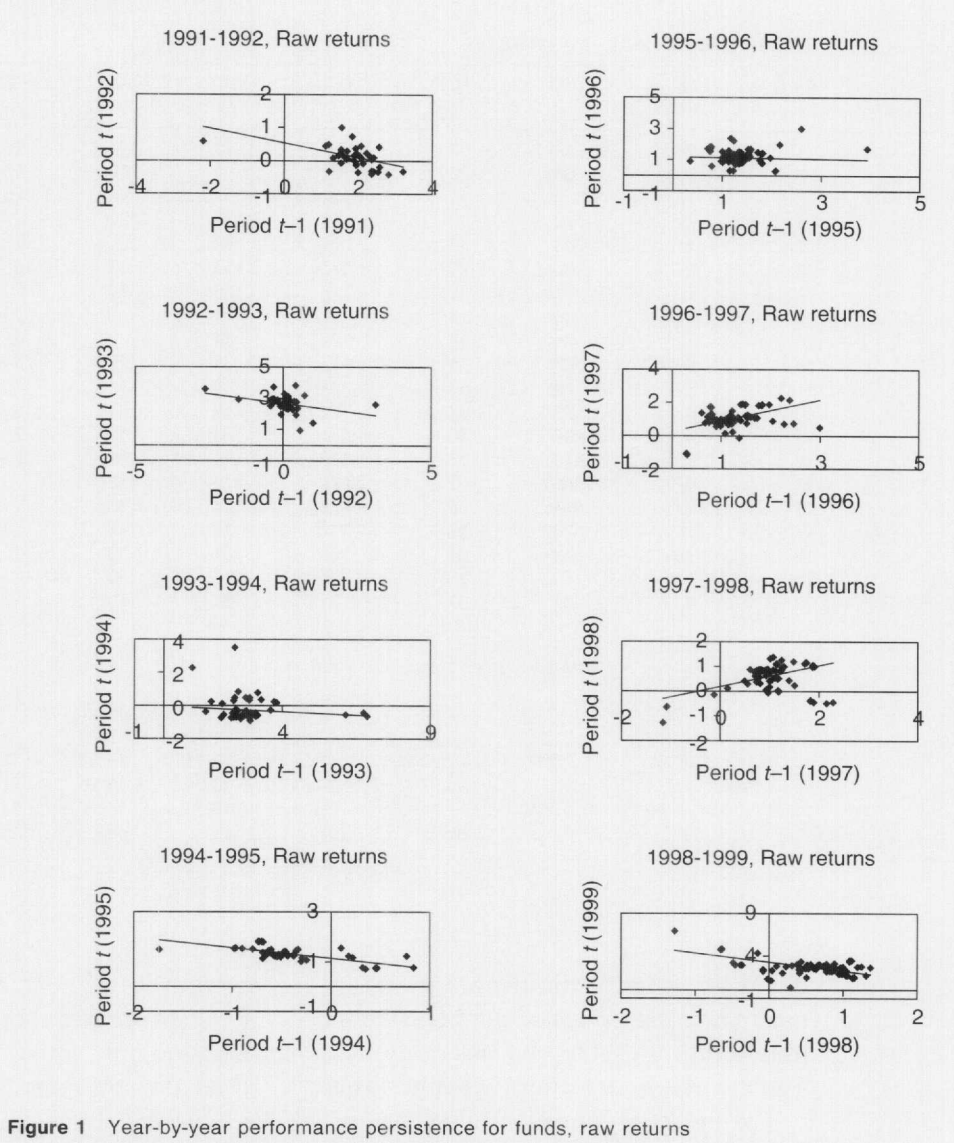

Figure 1 Year-by-year performance persistence for funds, raw returns

nine indicated negative persistence, that is, losing following a winning year. In addition, a separate analysis was conducted indicating little evidence of persistent underperformance (popularly termed the 'cold-hand' phenomenon, or LL) over the sample period. The authors repeat the experiment to test for a cold hand in fund manager returns or persistence in the LL category. A fund that was denoted a loser in the first year, tended to repeat the performance on 44 per cent of occasions over the sample period. Unlike the hot hand results, one significant result was recorded for 1994–95 with a *z*-test result of –3.5. This indicates significant reversal, that is, winning following losing and vice-versa. This is not evidence of a cold hand, but rather mean reversion. The non-parametric evidence suggests that, over the 1990s, winners tended to repeat 48 per cent of the time, a result largely harmonious with the toss of a fair coin.

Table 3 Two-way contingency matrix, raw returns

Raw returns Initial year		Next year Winner	Loser	% repeat Winners	z-test repeat Winners
1991	Winner	12	24	33.3	–2.0
	Loser	26	11		
1992	Winner	16	26	38.1	–1.5
	Loser	26	12		
1993	Winner	24	21	53.3	0.4
	Loser	20	22		
1994	Winner	14	33	29.8	–2.8
	Loser	35	11		
1995	Winner	38	28	57.6	1.2
	Loser	32	33		
1996	Winner	39	32	54.9	0.8
	Loser	32	36		
1997	Winner	44	25	63.8	2.3
	Loser	25	41		
1998	Winner	25	44	36.2	–2.3
	Loser	44	22		
1991 to 1999	Winner	213	233	47.8	–0.9
	Loser	240	188		

Risk-adjusted returns

Tucker *et al.* put forward that the most egregious error committed during any assessment of fund performance is conducting a comparison of fund returns without consideration of differential risk.[47] Furthermore, Tucker *et al.* observe that while researchers have been aware of the need to account for differential risk for more than 30 years, individual investors often persist in ignoring this critical issue. Motivated by the critique of Tucker *et al.*, the authors test for predictability in the risk-adjusted returns of Australian equity superannuation funds using Sharpe indices as a proxy.[47] The reward-to-variability or Sharpe ratio is a popular tool used by financial advisers recommending funds to retail investors, asset consultancy firms providing advice to trustees, and is the basis of star-rating systems for funds developed by firms such as Morningstar. Morningstar rates the investment performance of funds using a rating system of one to five stars. For a complete discussion of the anatomy of the rating system see Blume and Sharpe.[48,49] For an analysis of the impact of mutual fund age on Morningstar ratings see Morey.[50]

As with raw returns, Table 4 illustrates that those funds that top league tables on a risk-adjusted basis in any given year generally fail to outperform industry and market returns in the following period. The only period when a strategy of investing in the best performing funds (top five, ten and 20) garnered superior risk-adjusted returns was the 1993 selection period and 1994 investment period, with limited evidence of positive persistence also recorded in the second half of the decade. Across the entire sample period, an investor skilled (or lucky) enough to select the top five ranked funds each year achieved an average Sharpe index of 10.618 versus the all-fund average of 1.695. Next year, the average Sharpe for the best five performing funds falls to 1.587, which is below the average fund result of 2.101 and the Sharpe ratio for the market portfolio at 2.113. The fall from best performing in year t–1 to year t for risk-adjusted returns is dramatic. Evidence of mean reversion is prevalent with those funds that rank in the top five in a given year on a risk-adjusted basis, on average,

Table 4 Rank order of top five, ten and 20 funds, risk-adjusted returns

Risk-adjusted Rank in Year one	1992	1993	1994	1995	1996	1997	1998	1999	Average Year two
1	72	34	51	133	14	78	135	97	77
2	80	84	66	134	4	139	123	119	94
3	79	30	15	135	9	115	120	120	78
4	66	31	14	112	128	129	125	121	91
5	67	75	10	117	129	119	126	2	81
6	68	76	11	118	130	138	23	89	82
7	69	77	62	119	131	3	130	110	88
8	62	3	39	115	65	2	124	111	65
9	8	68	7	116	109	6	26	102	55
10	59	42	12	122	110	4	27	103	60
11	60	43	13	123	117	5	20	104	61
12	38	44	27	113	118	8	21	105	59
13	39	39	28	114	119	7	22	108	60
14	63	40	29	104	123	44	24	109	67
15	64	41	8	80	124	82	25	113	67
16	45	20	9	101	120	55	30	114	62
17	46	21	5	102	121	93	31	48	58
18	70	17	9	103	122	94	9	49	59
19	71	18	50	91	80	102	10	50	59
20	41	69	67	27	81	103	11	93	62
				Summary of average Sharpe ratios (pa)					
Top five funds	10.618	–5.826	0.581	3.734	–5.647	2.407	–2.155	–4.168	23.767	1.587
Top ten funds	8.447	–5.064	1.573	3.858	–5.694	0.243	–0.303	–3.142	19.354	1.353
Top 20 funds	6.419	–4.766	2.202	3.923	–4.577	–0.821	–0.549	–1.659	18.244	1.500
All funds	1.695	–4.097	2.491	2.635	–2.803	0.042	–1.260	–2.147	21.948	2.101
Market	1.977	–3.751	3.317	1.727	–0.738	–0.717	–0.485	–0.349	17.456	2.113
No. of funds	113	80	87	98	132	143	139	135	135	119

ranked 84 (of 119 funds) in the subsequent year.

The coefficient, *t*-statistic and R^2 data provided in Table 5 are the result of regressing fund returns in one year against returns in the next year where returns are reported for funds in both years. (For reasons of space the authors do not report risk-adjusted scatter diagrams for the eight periods. Summary results from the OLS regressions are provided in Table 5.) The risk-adjusted evidence provides no support to the hypothesis of investment managers having differential skill. In total, statistically significant results were recorded in four of the eight observation periods, however, an equal proportion of statistically significant positive and negative results were recorded, suggesting both positive persistence and reversal effects. Over the sample period, the relationship was not significant, with the estimated coefficient suggesting, on average, a slight reversal trend.

Table 5 Repeat-winner test results, risk-adjusted returns

Year	Coefficient	t-statistic	R^2
1991–92	0.0020	0.0524	0.0011
1992–93	–0.1066	–1.6023	0.0319
1993–94	–0.1127	1.2486	0.0191
1994–95	–0.4118	–6.4714	0.3152
1995–96	0.0045	0.0678	0.0025
1996–97	0.1294	2.1279	0.0320
1997–98	1.2486	12.0501	0.5219
1998–99	–0.7992	–3.0533	0.0660
1991–92 to 1998–99	–0.0057	0.5525	0.1233

Note that this test does not account for the possibility of cross-correlation among funds. For any given period it is likely that funds managed according to the same 'style' will perform similarly, at least to some extent.[5] To test for such potential

cross-correlation impacts on their conclusions, the authors attempted to repeat the experiments for fund categories. Morningstar's classification system, however, does not classify funds within 'Australian Equity Superannuation Funds — General' into categories such as growth, income, value, etc. Currently, the only distinguishing features of the funds relate to their names (eg ethical, imputation, small companies fund). The majority of fund names, however, are simply 'Fund Manager X Australian Share Superannuation Fund'. The authors are currently developing a characteristics-based classification system to differentiate manager styles. State-of-the-art research by Davis directly addresses the issue of whether any particular investment styles reliably deliver abnormal performance and considers whether any evidence of performance persistence can be found when funds of similar styles are compared.[51] For the period 1965 through to 1998, Davis finds that none of the styles employed by US equity mutual fund managers exhibit positive abnormal returns. He also reports some evidence of short-run performance persistence among the best-performing growth funds (hot hand) and among the worst performing small-cap funds (cold hand), however, both these results were not sustained beyond one year. Davis concludes that the impact of cross-correlation among funds is limited, stating that the economic benefit to active management is not obvious.[51]

Interestingly, across both raw and risk-adjusted returns, the use of past returns as an explanatory variable in a year-by-year cross-sectional regression fails to capture the cross-section of future returns in an economically meaningful manner. In both the raw and risk-adjusted year-by-year cross-sectional regression experiments, the Durbin-Watson statistics were 1.98 and 2.01 respectively. Given no evidence of serial correlation, the authors do not go further into the first-order autoregressive AR1 and Augmented Dickey-Fuller (ADF) test.

Again a non-parametric test of performance predictability was employed, on this occasion using risk-adjusted results, as a confirmatory measure. Table 6 shows there are minimal differences across the sample period in terms of the percentage of persistent winners and what would be expected by chance. As with the regression results reported in Table 5, significant

Table 6 Two-way contingency matrix, risk-adjusted returns

Risk-adjusted Initial year		*Next year* Winner	Loser	*% repeat Winners*	*z-test repeat Winners*
1991	Winner	19	29	39.6	-1.4
	Loser	16	9		
1992	Winner	21	23	47.7	-0.3
	Loser	26	10		
1993	Winner	19	25	43.2	-0.9
	Loser	11	27		
1994	Winner	21	23	47.7	-0.3
	Loser	38	11		
1995	Winner	28	62	31.1	-3.6
	Loser	24	18		
1996	Winner	28	27	50.9	0.1
	Loser	35	49		
1997	Winner	49	19	72.1	3.6
	Loser	48	19		
1998	Winner	41	57	41.8	-1.6
	Loser	9	27		
1991 to 1999	Winner	226	265	46.0	-1.8
	Loser	207	170		

positive persistence was recorded around 1997–98. However, a reversal pattern of significance was also evident from the 1995 (winner) to 1996 (loser). For the individual periods, seven years out of nine indicated negative persistence, that is, losing following a winning year. In addition, the data indicated no evidence of the cold-hand anomaly, with no significant results of loser-loser repetition in any of the observation periods. Over the 1990s, winners tended to repeat 46 per cent of the time, a result corroborating the raw return findings.

CONCLUSIONS AND IMPLICATIONS FOR FUND SELECTION

In this performance persistence study, two questions are addressed. First, what is the relationship between past fund returns and future performance? Secondly, does a 'hot hand' fund selection system deliver economically significant returns to investors? The results are easy to summarise. For retail investors faced with the problem of selecting a fund to manage the domestic equity portion of their asset allocation, there is little likelihood of earning abnormal returns by selecting the best performing fund managers from the previous period. The evidence presented in this study supports Bogle's claim that 'investment management is a field fraught with fragility and fallibility, where today's careful, rational fund selections are too often tomorrow's embarrassments' (pp. 94).[33] Bogle notes that while it is virtually impossible to pick the winning funds from year to year, it is easy to pick a single winner — a passive all-market index fund.[33] The evidence presented in Tables 1 and 4 highlights the superiority of the market portfolio against a cohort of active funds on a raw and risk-adjusted return basis.

Malkiel supports this claim, suggesting that most investors would be better off by purchasing a low-expense index fund, than by trying to select an active fund manager who appears to possess a hot hand.[5] Malkiel and Radisich find that index funds have regularly produced rates of return exceeding those of active equity funds by 100–200 basis points per annum in the US over the 1990s, finding that there are two reasons for the excess performance by passive funds: management fees and trading costs.[52]

The issue of fund expenses requires further analysis. The funds investigated in this study had an average annual management expense ratio of 3.7 per cent per annum. (Typically, the management fee is accrued daily and is payable quarterly in arrears (or upon the full withdrawal of the fund) by the redemption of units.) As discussed in the research design section of the paper, this study considered fund returns net of management fees but excluding entry and exit loads to test for return persistence. Therefore, when conducting the various experiments to test the hot-hand anomaly, the costs levied by the investment manager on entering and exiting their fund was assumed away. The average entry fee for the funds investigated was 1.8 per cent, with an exit load of 2.0 per cent. These institutional costs are considerable, and add further weight to the study's non-rejection of the null hypothesis of no differential skill among managers.

The active management techniques employed by the investment managers considered in this study appear to add little value in the transformation of retirement savings into retirement income. Active investing is high cost, incurs substantial entry and exit loads and generates higher taxation burdens for investors than a passive alternative. The marginal benefits (MB) of active management are far exceeded by its marginal costs (MC). Those funds that can achieve a resultant MB > MC from active stock selection in

any given year seem destined to reverse this trend the following year. The findings echo Kendall's well-known epithet that 'the series looks like a wandering one, almost as if once a week the demon of chance drew a random number from a symmetrical population of fixed dispersion and added it to the current price to determine the next period's price' (pp.23).[53]

Market efficiency survives the challenge from the performance persistence literature. Using a number of reasonable strategies, the results of this study provide little comfort for those retail investors (and their financial advisers) relying heavily on a fund's track record to guide selection. A rational, self-seeking agent would achieve their retirement income objectives far more rapidly through implementing a passive approach to both fund and asset selection. As investors proceed towards member choice in superannuation, the mean-reverting behaviour of investment manager returns raises a number of questions regarding the optimal design of a superannuation fund — a topic the authors will consider in their next paper.

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